Passing by the absence of fishes and crocodiles, which may yet be found, we have, for the first time, the association of *Palæosyops* with *Coryphodon*, genera hitherto characteristic of the Bridger and Wasatch beds respectively. The occurrence of true *Lophiodons*, for the first time exactly determined in America, is an interesting circumstance. Bats have not been recognized hitherto in the Wasatch formation.—*E. D. Cope.*

GEOGRAPHY AND TRAVELS.[1]

THE ROYAL GEOGRAPHICAL SOCIETY'S EXPEDITION TO LAKES NYASSA AND TANGANYIKA.—The serious misfortune which befell this exploring party in the loss of their leader, Mr. Keith Johnston, soon after their departure from the coast,[2] has not prevented the successful execution of the work assigned them. Mr. Thomson, who succeeded to the command, has completed his explorations, arrived back at Zanzibar and sailed for England about the middle of last July. His journey is the most important made in Africa during the past year. It is to be regretted that no observations could be taken, and that therefore Mr. Thompson's maps are not strictly accurate, but his descriptions, in his reports to the Society, of the countries and peoples visited, are clear and full, and contain much of great interest.

After the death of Mr. Johnston on the 28th of June, 1879, the expedition renewed its march over a country "half jungle, half forest," succeeded in a few days by a more varied tract broken by sharp ridges and narrow glens. Basalt appeared at the surface in a very discomposed form. In the glens there was an abundant flora, while on the tops of the ridges, owing to the too porous soil, everything green was shriveled up, even to the trees, under the fierce sun. "A porous surface stratum in Africa has always this result; if the surface is not damp and marshy it becomes a desert." Crossing the River Ruaha, one of the chief branches of the Lufigi, at about long. 37° E., lat. 8° S., it was found quite unnavigable even for canoes, owing to the rapids and rocks. The Uranga, the other branch of the Lufigi, is, however thought to be navigable for the largest river boats as far as the point visited at Mkomokero, in the M'henge country, and probably further.

The M'henge country is a plain kept constantly damp throughout the year at the base of the M'henge mountains, and is necessarily very fertile. It is about forty miles in length by twenty broad, and occupies the angle formed by the junction of the Ruaha and Uranga. The people are a superior race to the neighboring tribes. Their houses are generally built on poles, and are of the most peculiar character, in some cases being built on a platform with a huge roof (the house being circular) projecting

[1] Edited by ELLIS H. YARNALL, Philadelphia.

[2] See NATURALIST for October, 1879, p. 660.

all around and reaching a much lower level than the platform, so that nothing is seen but a large cone elevated on poles. The Uchungwe mountains were next crossed. They are a large number of mountains separated from each other and trending generally north and south along the edge of the great plateau reaching to the west, rounded in appearance and covered with vegetation. From east to west there is a general rise in altitude up to 7000 feet, and further south to 8000 and 9000. The plateau is about 6700 feet above the sea; its structure is of soft clay-slate till near Nyassa, where the rocks become volcanic.

Across this table land of Eastern and Central Africa, they pursued their way through a bleak, monotonous moorland-like country, very scantily inhabited and called Uhehe. The inhabitants (Wahehe) depend to a great extent upon their cattle. The climate is very trying. The temperature varies throughout the twenty-four hours from above 80° to below 50° with exceedingly cold north-west winds.[1]

On approaching the northern end of Lake Nyassa, Thomson crossed the lofty flat-topped ridge whose western escarpment descends abruptly to its shores, and was named by travelers on the lake, the Konde mountains, but appears now to be only the western edge of the great plateau. He reached Mbungo, near the head of the lake on September 22, 1879.

Starting again from Mbungo on the 28th, the expedition reached Pambete, on the southern shores of Lake Tanganyika, on the 4th of November. The width of the belt of land which separates these two great navigable lakes was found to be two hundred and fifty miles.

The Konde country which they first traversed lies at the north-west corner of Nyassa, and occupies a deep triangular indentation in the central plateau which bounds it on all sides except on the east. "Near the lake extends a broad plain of wonderful fertility, with a large population." At a height of 3000 feet they found a very broken, ridgy country. From the western limit of

[1] At a meeting of the Royal Geographical Society, Mr. Francis Galton, in speaking of the physical geography of this plateau region, alluded to the strong warm water current which sweeps down the south-east coast of Africa, producing extraordinary variations of temperature, marked atmospheric disturbances and peculiarities in the direction of the winds south of the Cape of Good Hope. "The southern part of Africa was a great plateau, across which the easterly winds that swept over the surface of the Indian ocean could not blow, but by which they were deflected. The mountainous plateau which south of Natal rose to an average height of 4000 feet, increased in height at the latitudes of Natal and Zululand, and now it had been ascertained by Mr. Thomson that at the side of Lake Nyassa it attained a height of 7000 or 8000 feet. There could, therefore, be little doubt that the deflection of the wind began north of the channel between Mozambique and Madagascar, and that the current was produced by the deflected portion of the winds of the Indian ocean that urged the sea before it, so that the peculiarities of the weather experienced far to the south of the cape, and the different courses that had to be followed by outward and homeward bound vessels, were primarily due to the physical conformation of the south-eastern corner of Africa, beginning with that part described by Mr. Thomson."

Konde, long. 33° 45′ E. and lat. 9° 22′ S., the extremely steep face of the plateau commences, and the ascent from 3300 to 6500 feet above sea level in the country of Nyika was made. The highest point reached was on the Munboya mountains at the elevation of 8180 feet. From these mountains the ground descends through barren woodland till long. 32° 45′ is reached, where the altitude is only 3300 feet. To the west Nyika is bounded by the Chingambo mountains, running north and south and rising to 5000 feet. These mountains are in long. 32° 45′ E. and lat. 90° 5′ S. On crossing them they were found to slope away gradually to the west. They then passed through Mambwe and Ulungu where the wooded ridges rise to 5000 feet to Tanganyika. Mr. Thomson believes the rise in the waters of Tanganyika to be periodical and according to the amount of rainfall.

Leaving Pambete on November 10th, Thomson established a permanent camp for his expedition at Liendwé, on the Lofu river, and then taking a few of his followers advanced into the country of Itawa, occupying a very hilly plateau and exceedingly difficult to march through. "There was not a mile of level ground, but hills followed hills, all of the most precipitous nature, varied only here and there by some lower ridge." The adjoining country of Marungu was also traversed, and presented even more difficulties. "The mountains rise to a height of 7000 feet with smooth rounded outlines, except where they face the lake. Large streams are numerous and must make the country almost impassable during the rains." The people also were most excitable and suspicious, and great difficulty was experienced in overcoming their hostility. As they approached the Lukuga both the country and the people improved; the mountains decreasing in altitude, and along the streams the fertile soil supports a large population who were friendly and hospitable. "Early on the morning of Christmas day," Mr. Thomson writes, "from the top of a high ridge I had the pleasure of seeing the Lukuga, as a noble river flowing with rapid movement and whirling eddy away to the far west, unchecked by sand bars or papyrus, and requiring no experiments with straws or other objects to ascertain the existence of a current." The barrier seen by Stanley was found swept away; the river, narrowed at this point, rushing through with great force so as to be utterly impassable for canoe or boat. "The barrier of mud and papyrus was swept away either two or three years ago, the waters of the lake having been rising till that time; since then there has been a fall of seven feet, according to the observations of Mr. Hore at Ujiji, who was also the first to see the Lukuga as an indisputable river."[1] From here he continued on to

[1] Mr. E. C. Hore, of the London Missionary Society, visited the Lukuga in April, 1879, and found it a large river flowing out of the lake. From the high ridge above the stream he saw it flowing outward as far as the eye could reach towards the Lualaba. Cameron and Stanley both visited the Lukuga in the dry season.—*Editor.*

Kasenge and Ujiji. No details of his return journey have been received as yet. He is known, however, to have followed the Lukuga for many days on its course to the Lualaba or Congo. He then returned by the lake to his camp, and finally reached the coast by a new route past the unvisited Lake Hikwa.

At the same time that Mr. Thomson was crossing from Nyassa to Tanganyika, the journey was being made by Mr. James Stewart, of the Mission station at Livingstonia. He left the former lake at Kambwe lagoon about twenty-five miles south-west from Mbungo, on October 14, 1879.

The ascent to the plateau was not so steep here as the R. G. S. expedition found it to be, and was accomplished in two days, when the elevation of 3900 feet was attained. Continuing to keep to the south-west of the route of Thomson, he found the average elevation of the plateau 4700 feet. The rain fall of the country is large, and its climate cool and bracing. The route over this plateau was a remarkably easy one, gradually rising from 3900 feet to 5400 at the ridge overlooking Tanganyika, and there is not one difficult ascent. The descent to the lake is gradual, and took two days. The distance from Kambwe lagoon to Pambete was found to be 254 miles. Here he met Mr. Thomson and remained with him until his departure, when Mr. Stewart returned to Nyassa, reaching it again on December 3d. The homeward march was only 232 miles in length, and could be shortened probably to 210.

In Chungu he found the trees thickly covered with large caterpillars three or four inches long and as thick as the fore finger. The natives were gathering them in great numbers, to preserve them for food. One kind was a light pea-green color, the other dark with white spots and sharp spines on the back.

MICROSCOPY.[1]

PERMANENT MICROSCOPIC PREPARATIONS OF PLASMODIUM.—Mr. S. H. Gage advises picric acid as a means of hardening this interesting motile form of the Myxomycetes, without change of color as by osmic acid, or shrinkage and change of color by drying. Pieces of rotten wood containing plasmodium are placed on moistened microscopic slides, taking care that some of the protoplasm touches the slide, and the whole placed under cover to prevent drying. In an hour or so any plasmodium that may have crawled out upon the slide, may be fixed by placing the slide a few minutes in a mixture of equal parts of ninety-five per cent. alcohol and a saturated aqueous solution of picric acid. Yellow plasmodium may then be at once mounted, through absolute alcohol in balsam; but white forms should be first bleached in twenty-five per cent. alcohol.

[1] This department is edited by Dr. R. H. Ward, Troy, N. Y.